

Welcome everybody. So, I just want to spend a couple of minutes giving you an overview of the types of research that the global research community are doing and exactly who's using it. Okay, so just to remind ourselves and for those who perhaps are a bit less familiar about the project as a whole, UK Biobank is a truly open access resource available for bona fide researchers, both in academia and commercial companies to perform health-related research that's in the public interest, so we have a very broad remit. Both available to UK researchers and worldwide, there's no preferential or exclusive access to the resource and we do ask researchers to return their results back to us once they've published their findings so that we can incorporate those results back into the resource and to be shared by others. So, research applications, they can be broad, they don't need to focus on specific risk factors or health outcomes. They can involve a wide range of genotypes or phenotypes for GWAS/PheWAS type analysis or that could be purely methodological by nature, but we do ask that the scope of the research project can be clearly defined so that your intended research goals are clear so that we have a fair idea about what it is you're intending to do.

So, we opened for business in March 2012 and, as of a couple of weeks ago, we've got about 7,500 approved registered researchers, 1,400 applications submitted to UK Biobank and over 750 projects are currently underway, and already there's over 400 publications and you can go to our website to have a summary of all of the approved research projects that are out there. So, this graph just shows the number of registered researchers using UK Biobank over time since we opened for business and what you can see is the massive increase in interest in the use of the resource. The blue area is UK-based researchers and the red is international researchers, so what you can see now is that by the end of last year about two-thirds of registered researchers were actually from overseas, so it's gradually becoming a resource that is of high interest to the international community. So, where are all these researchers based? Well we have about just over 3,000 in the UK, about 2,500 in the US and Canada, about 1,000 across mainland Europe, a hub of research activity in Australia and then few researchers elsewhere, so that's really where the main researchers are located.

In terms of publications, as I said, we've got about 475 original peer-reviewed research papers using the UK Biobank and, as you'd imagine, that is increasing over time with over 3,500 citations from those research papers. So, this is a table showing the ten most highly cited publications and what I found of interest here was that it covers a really broad range. So, for example, you can see the top and the third one, these are meta-analysis where UK Biobank has contributed a large amount of data, pooled with other large studies, looking at the association between BMI and subsequent mortality, that work was done by the Global BMI Mortality Consortium in the *Lancet*, and then this third paper here was also a meta-analysis with UK Biobank contributing a large amount of data published by the Emerging Risk Factors Collaboration looking at cardiometabolic factors in relation to subsequent death.

There's been a few GWAS analysis which have been of high interest to other researchers, so for example the Social Science Genetic Association Consortium have got two papers here that are highly cited,

one looking at GWAS of education, one on subjective well-being and mental health, both of these in high impact journals and with high research interest. The early GWAS from the UK BiLEVE colleagues from Leicester looking at GWAS of smoking, lung function and COPD and the genetic research looking at polygenic risk for scores in relation to cognitive function and health outcomes from a group in Edinburgh have also been of interest, but it's not just genetics. So, for example, a group in FMRIB in Oxford have published research looking/using brain imaging and how they've derived a whole range of imaging-derived phenotypes from the brain scan that's been of high interest to other researchers in the field. Also other analysis, so for example looking at the relationship between hearing loss and cognition has published by a group in Manchester, has been of high interest to others, as has other research specifically looking at different obesity cut-offs for diabetes and different ethnic groups. So, it really does show you that UK Biobank, it's being used for a broad range of research purposes that are of high interest to the research community.

So, in terms of the most productive institutions with regards to publication output, the top ten mainly, at the moment at any rate, are UK-based organisations, which is perhaps not surprising. It was the UK academic institutions that were aware of UK Biobank at the beginning and many of these institutions helped to form UK Biobank or involved in the design and advice to UK Biobank, although you can see there's two institutions in the US, the Broad and Harvard, who have also been pretty quick off the mark in terms of having a large research output using UK Biobank data. If you focus a bit more on the international communities that are really engaged with the resource, as well as the Broad and Harvard, you've also got a group in Queensland in Australia who are heavy users of the resource and I know there's colleagues here today to represent them, also Massachusetts in the US, and then institutions across mainland Europe, in the Netherlands, Karolinska in Sweden and so on, so a really geographical breadth of interest using UK Biobank as well.

So, this just shows the amount of collaborations across the resource, so if you can visualise a map of the world here, you have the red blobs here in the middle are the UK institutions, the research that's been done in the UK and what you can see here is that these institutions in the States, so like Stanford, the Broad, Harvard, they're collaborating quite extensively with colleagues, deCODE up in Iceland up here, they're collaborating with colleagues in the UK and mainland Europe and also with colleagues in Australia as well and, likewise, colleagues in Australia are collaborating with people in the UK and in Europe and in the US. So, what this [tells 0:07:52.5] to me is not only is there a wide breadth of research that's been done in UK Biobank, but that the collaboration in using the resource is really truly international and I hope as part of today we can find the opportunity to really foster those collaborations in terms of the research that's been done on UK Biobank.

So, in terms of types of research that people are doing, as you might expect, the vast majority are in the realm of public health and health services, but also an awful lot of genetic work going on in UK Biobank, clinical sciences and psychology, but also perhaps less obvious things as well. So, as Rory mentioned, there's a lot of interest in eye measures, a lot of interest in AI and image processing, immunology, core statistics methodology, nutrition and food sciences, and so on and so forth, so it really covers a wide breadth. In terms

of the most popular health outcomes published so far, cardiovascular disease, about 22 per cent of papers have something to do with cardiovascular disease, metabolic and endocrine conditions, particularly diabetes, there's a lot of research in that area, as is cancer, mental health and so on. Also, as you can see, there are researchers also looking at a wide range of other health outcomes and I'm sure that will continue to grow as we develop more linkages and more summary health outcomes which I know Cathie will talk about a bit later on.

So, I just want to end here. When you submit an application you put in keywords for your application, this is just a graph showing those keywords summed up, so this is what you guys are all working on in UK Biobank and I for one is [sic] certainly looking forward to hearing about the research being done and I just encourage you to talk to each other and make the most of the opportunity today to foster collaborations, so thank you very much [applause].

[END OF TRANSCRIPT]